

# Obstetric Shock

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OBSTETRIC shock is one of the most serious of the accidents associated with child-birth. Puerperal sepsis is the only condition responsible for a larger proportion of maternal deaths. Out of 141 consecutive deaths occurring in the Belfast Maternity Hospital, and the Royal Maternity Hospital, Belfast, during the ten years, 1927-36, twenty-three, i.e., 16.3 per cent., were due to obstetric shock. More distressing still is the fact that twelve out of the twenty-three women who died had attended the hospital ante-natal clinic. As there were forty deaths in ante-natal cases, this means that thirty per cent. of these deaths were due to obstetric shock.

TABLE I.

COMPARISON OF DEATH-RATE IN ANTE-NATAL AND EMERGENCY CASES.

		Ante-natal cases	Emergency cases	Total
Obstetric shock	- -	8.5%	7.8%	16.3%
Puerperal sepsis	- -	4.2%	19.1%	23.3%
Eclampsia	- -	0.7%	10.0%	10.7%
Heart disease	- -	2.2%	8.5%	10.7%

From Table I it appears that obstetric shock is the only common cause of death that is not benefited by ante-natal supervision.

Apart from the fatal cases of obstetric shock, there is a much larger number whose lives hang in the balance for several hours.

Obstetric shock appears to be the same condition as surgical or traumatic shock, and is usually divided into two types—(a) primary shock, (b) secondary shock.<sup>1</sup>

Primary shock is usually attributed to afferent nervous impulses causing reflex vaso-dilatation and a profound fall in blood-pressure. This is due chiefly to dilatation of the capillaries of the skeletal muscles of the limbs. The patient may recover from this completely or temporarily, or pass directly into a state of secondary shock.

Secondary shock is little understood, and it is very uncertain what part afferent nervous impulses play, and to what extent vaso-dilator substances liberated from injured tissues can be held responsible.

Cannon and Bayliss were of the opinion that secondary shock was produced by some vaso-depressor chemical agent derived from injured tissues. They produced traumatic shock in anæsthetized animals by crushing the muscles and bones of the hind limb, and stated that the shock could be prevented if the venous return from the damaged area was occluded; also that division of the nerve-supply to the limb

did not prevent the development of shock. The vaso-depressor substance was thought to be histamine, because traumatic shock resembled the condition produced by poisonous doses of histamine, and also because histamine can be liberated at any rate from the skin by injury.

Doubt has recently been placed on these experiments and conclusions. Some workers say that very little shock may follow trauma if the afferent nerves of the limb have been severed and the blood-supply left intact. It has been suggested that in the experiments of Cannon and Bayliss the afferent limb-nerves were unable to transmit impulses, as they were deprived of their blood-supply. Also, it has not been possible to isolate histamine or a depressor substance in the blood leaving the traumatized limb. In addition, the appearance of the viscera in experimental shock is quite different from that in histamine poisoning. In the former the organs are pale and anæmic, and in the latter intensely congested. It seems, therefore, that in some way nocuous afferent impulses in injury do depress the circulation.

In experimental shock, loss of fluid from the circulation is found to be an important factor. This is caused by hæmorrhage from the cut vessels, and also by escape of fluid from vessels that have become more permeable but are not themselves ruptured.

This point is interesting in relation to obstetric shock, for in the twenty-three cases of shock mentioned above there was post-partum hæmorrhage in eighteen cases; and as two cases died before delivery, this means that ninety per cent. of the cases of obstetric shock were associated with excessive blood loss.

Three possible factors, therefore, are present in shock—

1. Reduction of blood volume.
2. Depressor afferent impulses.
3. Undetermined chemical depressor agents.

#### CLINICAL EVIDENCE OF SHOCK.

A profound degree of shock is easily recognized. In the early stages it may easily be missed unless the blood-pressure is taken. In a well-marked case the patient lies still and takes no notice of her surroundings. Her limbs are flaccid. The skin is cold and pale, often with a slightly grey or bluish tinge, and is frequently covered with drops of sweat. The respirations are shallow. The pulse is running and of poor volume, and is usually rapid. The blood-pressure is low—it may even be too low to be recorded. This varies as the condition improves or deteriorates, and is the most important single point in the prognosis and treatment.

Shock is often associated with hæmorrhage. Loss of blood alone usually causes restlessness, and the patient is mentally alert and often anxious. The late stages of shock and hæmorrhage are the same. This is because shock is the result of paralysis

of the medullary centres due to over-stimulation, and excessive loss of blood leads to anæmia, and thus to paralysis of their centres.

The following fatal case of obstetric shock is instructive. The patient was a primigravida, aged 41, who was admitted with pre-eclamptic toxæmia when she was thirty-four weeks pregnant. She was treated by starvation, diaphoresis, and moderate purgation. Induction was advised soon after admission, but was refused until the thirty-seventh week. At this time the membranes were artificially ruptured. Labour commenced thirteen hours later, but the pains were poor. During the whole of labour the patient showed evidence of extreme fear, and insisted that she was going to die. She was also under the impression that people were talking about her and saying she was insane. This was counteracted to some extent by scopolamine amnesia. The first stage lasted sixty-seven hours, and forceps were applied one hour later. The head was high, but the delivery was not difficult. The placenta failed to separate, and was manually removed forty minutes later and the uterus curetted. This was easy, and the blood loss was, if anything, less than usual. The patient was by this time extremely shocked, with a systolic blood-pressure of 65 mm. Hg., but after warmth, morphia, coramine, and intravenous gum saline solution, her condition was greatly improved, and the systolic blood-pressure had risen to 114 mm. Hg. The blood-pressure remained at this level for about one hour, but then fell rapidly. More gum saline was given, and the blood was cross-typed with that of her husband. While the saline was being given the uterus relaxed and bled freely, and did not respond to stimulation by pituitrin, ergometrine, and massage. The patient died within five to ten minutes.

#### PREDISPOSING FACTORS IN SHOCK.

Why one woman becomes shocked and another does not is unknown, but there are several well-marked predisposing factors. These are :—

1. *Hæmorrhage*.—This is the most important single factor, for although marked and fatal shock does occur without loss of blood, in most cases there is associated hæmorrhage. This may be ante-, intra-, or post-partum.

2. *Fear*.—This is a very potent factor in the production of shock. Many women have a profound fear of labour which they are usually unwilling to admit even to themselves. One result of this is that uterine contractions are weak and irregular, and the cervix may take many hours or even days to dilate. This results in excessive fatigue, with its associated evils. As a result, forceps are usually required, and post-partum hæmorrhage in these cases is not uncommon. Fear and anxiety alone can apparently cause death. The classical example is that recorded in the Bible : “And his daughter-in-law, Phinehas’s wife, was with child, near to be delivered: and when she heard the tidings that the ark of God was taken, and that her father-in-law and her husband were dead, she bowed herself and travailed; for her pains came upon her. And about the time of her death the women that stood by her said unto her, Fear not; for thou hast born a son. But she answered not, neither did she regard it”—(I Samuel iv, 19, 20).

3. *Obstetric Interference*.—Profound shock is nearly always present in such conditions as inversion of the uterus, concealed accidental hæmorrhage, ruptured uterus, etc. Manual removal of the placenta is commonly associated with obstetric shock, although hæmorrhage is not always a factor. Out of our twenty-three fatal cases, manual removal was necessary in twelve, and excluding two cases who died undelivered and two who died with the placenta *in utero*, this means that in sixty-three per cent. of the fatal cases of obstetric shock the placenta had been removed manually.

Phillips<sup>2</sup> thinks that lacerations of the pelvic floor are associated with shock possibly due to the liberation of histamine from the damaged muscles. In most cases of shock, extensive lacerations do not seem to be present, but there is no doubt that difficult deliveries, e.g., high forceps, craniotomy, etc., are more liable to be followed by shock than cases which are easily delivered. Packing the vagina is highly productive of shock, and even suture of the perineum may make all the difference between life and death.

4. *Fatigue*.—There is no doubt that fatigue plays an important part in the production of shock.

5. *Starvation*.—It was frequently found during the Great War that deprivation of food and water strongly predisposed to shock. Great difficulty arises in this connection in the treatment of the next condition of—

6. *Toxæmia*.—Cases of pre-eclamptic toxæmia are not infrequently associated with shock. The toxæmia is not alone responsible; probably the starvation, purgation, and diaphoresis to which patients suffering from this complaint are subjected during treatment plays no small part in the production of shock. The capillary vessels are damaged in toxæmia, so if any stagnation occurs the fluid will leak out of the vessels into the tissues more readily than normal.

7. *Pain*.—Pain is no small factor in the production of shock. That pain can cause profound shock can be noted in nearly every case after a vigorous Crede's expression of the placenta, although some other factor is also concerned, as some degree of shock occurs even when the patient is anæsthetized. Shock is marked in severe cases of concealed accidental hæmorrhage. This is at least partially due to the increased intrauterine tension which produces pain, and the general condition of the patient immediately improves when the pressure is relieved, either by rupture of membranes or by Cæsarean section.

8. *Anæsthesia*.—Although in many cases the intelligent use of anæsthesia and analgesia diminishes shock, it may have exactly the opposite effect. In some cases, especially in hospital, analgesics such as scopolamine and the barbiturates cause extreme restlessness. As a result, the patient becomes fatigued and frequently chilled. Again, if the analgesia is commenced too soon, labour may be unduly prolonged. Hæmorrhage is also slightly more severe after analgesia.

Prolonged anæsthesia leads to shock. Chloroform is the most dangerous in this respect. Ether, during the actual administration, is safer, as it stimulates the blood-

pressure, but the fall afterwards may be great. Dale<sup>3</sup> has shown that chloroform and ether, but not nitrous oxide, sensitize the capillaries to the action of histamine, so that in unanæsthetized animals about ten times the dose of this drug is needed to produce an equivalent depression of blood-pressure. Nitrous oxide given skilfully does not produce shock, but this may occur if there is inexpert administration producing restlessness and cyanosis. There is much less danger from an anæsthetic which is too deep than from one which is too light; the latter is specially to be guarded against.

9. *Exposure*.—This causes chilling of the patient, and is very productive of shock. On the other hand, heating the patient until she sweats is almost worse, as it causes loss of fluid and also lowers the temperature.

10. *Poor general condition from any cause*.

#### TREATMENT OF SHOCK.

(a) *Prophylaxis*.—Prevention of shock is better than cure. Many cases of shock should be prevented by ante-natal supervision. The general condition can be improved by adequate food, exercise, and sleep. Toxæmia should be treated, but it is well to remember that the treatment of toxæmia by starvation and elimination may be more productive of shock than the toxæmia itself. If the toxæmia is of such a degree that a very restricted diet is considered necessary, the patient should be induced within a few days.

The chief value of ante-natal care in relation to the prevention of shock is the opportunity it provides for gaining the confidence of the patient, and so being able to reassure her that all is likely to be well. This is comparatively easy in private practice, but is apt to be neglected in the rush of a busy ante-natal clinic. If fear is eliminated, labour is likely to proceed rapidly, provided there is no gross abnormality. Emphasis should be laid on the fact that labour is a physiological process, and that most cases are perfectly normal. The modern tendency is to regard pregnancy and labour as some dangerous and terrifying experience that should be undertaken only once or twice in a lifetime. Delivery at home is probably much less alarming to a woman than in the strange surroundings of a hospital labour ward. It is difficult for a patient to approach delivery calmly after she has heard the cries of a woman in an adjacent bed.

Primigravidæ should be warned against discussing their condition with friends and relatives. Many multiparæ delight in relating to those pregnant for the first time the pain and horror of labour. The Church lays stress on the "great pain and peril of childbirth." The amount of discussion in the lay press about maternal mortality also has a profound effect on the attitude of a woman facing her first labour. The following is taken from a resolution by the British Medical Association, 1935: "Maternal mortality is a scientific and administrative problem which deserves careful and scientific study, but, in the experience of practising doctors, the publi-

city which it is receiving to-day is tending to terrify the child-bearing woman, and is, in itself, a cause of increased mortality."

Morphia should be given before ill-tidings of any description are conveyed to a recently delivered woman. It has been said that shock is more common after a lost battle than after a victory. She should not be told immediately that the baby is dead or deformed, nor should she be shown a child delivered by the face or one that is much moulded or marked by forceps. On the other hand, when a woman is delivered of a healthy child she should be shown it at the earliest opportunity—"A woman when she is in travail hath sorrow, because her hour is come : but as soon as she is delivered of the child, she remembereth no more the anguish, for joy that a man is born into the world"—(John xvi, 21).

Proper management of the delivery, especially the third stage, is more important than ante-natal care. If the first stage is prolonged, sedatives should be given, and the patient should not be left any longer than necessary in the second stage. If labour is prolonged, large amounts of glucose should be given.

About ninety per cent. of cases of shock are associated with excess hæmorrhage, either before or after the delivery of the placenta. Hæmorrhage cannot be prevented in all cases, but frequently it is associated with bad management in the third stage. The person in charge becomes impatient before the placenta is separated, and attempts at expression of the partially separated placenta are a potent cause of hæmorrhage. Even if the placenta is expressed completely, pieces of chorion are frequently left behind. There is some difference of opinion with regard to the management of the third stage. Some authorities advise control of the fundus, while others leave the uterus completely alone. If the outline of the uterus can be seen through the abdominal wall, there is no need to touch the uterus at all during the third stage; if not, the height of the fundus should be felt from time to time with the hand, but on no account should it be squeezed, grasped, or massaged. Only when the attendant is satisfied that the placenta is completely separated should it be expressed. No attempt to determine this should be made for at least twenty minutes after the birth of the child. Patience is the keynote of the safe conduct of the third stage. If general anæsthesia is necessary for delivery, the injection of from three to five units of pitocin counteracts the depressing effect of the anæsthetic on the uterine contractions and hastens the separation of the placenta.

If bleeding occurs during the third stage, this must be controlled. Hæmorrhage with the placenta *in utero* is always difficult to treat. Expression is a potent cause of shock, and if this is necessary because of hæmorrhage, the patient should first be anæsthetized. Each case must be treated on its own merits, and although manual removal of the placenta is usually fatal if the shock is severe, there is no use in attempting to treat the shock while the patient is bleeding badly. The wisest thing is to remove the placenta, either by expression after cord injection or manually before the shock is severe. Manual removal should be preceded by the administration of morphia. Any operative interference is highly dangerous if the systolic

blood-pressure is below 100 mm. Hg., and should be undertaken under gas and oxygen anæsthesia.

The vagina and perineum should not be sutured if any degree of shock is present.

(b) *Treatment of Established Shock.*—Shock is a temporary condition, and the aim in treatment is to keep the blood-pressure raised until the patient recovers.

Rest and warmth are the chief essentials. Rest is obtained by adequate dosage of morphia. The patient must be warm, but care should be taken that she is not overheated—this is at least as serious as not warming the patient sufficiently. It is often forgotten that blankets should be placed under as well as over the patient. It is not rare to see a woman covered with many layers of blanket, but who is lying on a cold mackintosh sheet possibly in a wet nightgown. If hot-water bottles are used, they should be covered and great care taken to prevent burns. A shocked patient burns very easily. Warmth and morphia alone are sufficient for a mild case of shock.

Movement of a shocked patient should be avoided as much as possible. Women with retention of the placenta should be treated in their own homes, and not transported to hospital from their warm beds, possibly in a cold, draughty, jolty ambulance. In many cases the transport of the patient removes any chance of recovery she may originally have had. If she has to be moved at all, this must be done as gently as possible. It has been shown that even turning a patient over lowers the blood-pressure 10 mm. Hg.<sup>3</sup>

The blood-volume must be restored. In mild cases hot drinks or rectal salines may be sufficient. In the more severe cases the volume should be restored by intravenous fluid. If blood is not immediately available, gum saline is probably the most efficacious. The fluid should be given at a temperature of 105 to 110° F., and should be run in very slowly, especially where shock is not associated with hæmorrhage. The deeper and more lasting the shock, the more slowly must the fluid be injected, or there will inevitably be a subsequent drop in pressure. This fact is very difficult to remember. One pint of fluid is quite sufficient at one time, but this may need to be repeated. Too large amounts of fluid probably do more harm than good by diluting the peripheral blood. The only safe guide to transfusion is repeated blood-pressure readings. Intravenous transfusions should be given early, as it was found during the war that in the late stages of shock the capillaries are so damaged that they will not even retain gum saline. Blood-transfusion is of very great value, especially when blood has been lost.

It is doubtful if raising the foot of the bed is of very great value. It is only if the blood is in the large veins that this can be of use, and although this may occur to some extent in primary shock, it does not in secondary shock. This position is also very uncomfortable for the patient. With the same object in view a tight abdominal binder after delivery is useful, but if the patient is bleeding it causes difficulty in controlling the fundus. Binding the lower limbs very tightly over cotton-wool is much more useful. The person in charge must watch the condition

of the toes carefully, and the bandages must be removed in a few hours and immediately there is any evidence of defective circulation in the toes. Gangrene of the feet has occurred from the abuse of this very valuable therapeutic measure.

Drugs, other than morphia, are of less value in the treatment of shock. Strychnine mainly raises the blood-pressure by stimulating the vasomotor centres in the medulla, and these in a condition of shock are inhibited or exhausted by over-stimulation. Strychnine in mild degrees of shock will raise the blood-pressure, but the effect is temporary, and is followed by greater depression than before owing to the further exhaustion of the centres. The use of strychnine in shock is, therefore, definitely harmful. The same may be said for caffeine, ether, etc. Coramine is probably of more value, as it is a direct respiratory stimulant.

Adrenalin has often been used, as it causes vaso-constriction in the shocked animal, and its action is apparent even in an animal whose brain has been destroyed by pithing. The effect, however, is transitory, and ephedrine, which has a slower but similar action, would seem to be more useful. Phillips<sup>2</sup> says that adrenalin, although causing vaso-constriction in the skin-vessels, also causes an increase in the volume of blood in the voluntary muscles and in the intestine. If this is so, the use of adrenalin in shock is definitely contra-indicated. Pituitrin is useful, as it causes a marked vaso-constriction by peripheral action. It is of added value if uterine hæmorrhage is also present, and should be given in combination with ergometrine in post-partum hæmorrhage. "Post-pituitary shock" is described. This is a condition of shock which may follow immediately upon a dose of pituitrin. It is particularly liable to occur if the dose is repeated within one hour. The shock is thought to be due to intense spasm of the coronary arteries possibly due to some impurity. Pitocin, being free from any pressor principle, is said not to cause shock. The treatment is to give adrenalin.

The patient who is shocked or has bled after delivery must not be left for several hours. Far more patients die of shock two to six hours after delivery than before this period. Miles Phillips has emphasized the fact that the only true guide to the condition of the patient is the systolic blood-pressure. This should be taken at least every half-hour for several hours, and any fall should be met by restorative measures.

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